

CLAIMS

- 1 A method of monitoring an energy conversion appliance of a kind which, in normal use, performs two or more operational events in a pre-determined sequence, each said event having a different acoustic signature, said method comprising providing a sound receiving transducer and positioning said transducer to receive sound signals emitted by the appliance during two or more operational events, providing output means associated with said sound receiving transducer, said output means being responsive to the sound emitted by the appliance, and employing a monitoring means to compare said received sound signals with pre-established data.
- 2 A method according to claim 1, wherein the monitoring means is operable to determine whether each acoustic signature indicative of an operational event has occurred at the normal position or one of a plurality of normal positions of that operational event in a normal operating sequence of the appliance.
- 3 A method according to claim 1 or claim 2, wherein the monitoring means is provided with and stores operating sequences indicative of correct functioning of the appliance and is operable to compare the order of occurrence of different acoustic signatures with the or each stored operating sequence.
- 4 A method according to any one of the preceeding claims, wherein the monitoring means is operable to determine whether an acoustic

signature indicative of an operational event is concomitant with normal performance of that operational event.

- 5 A method according to any one of the preceeding claims, wherein the output means is responsive to occurrences of the sound emitted by the appliance, or by a single operational event, departing from said sound profile concomitant with proper functioning of the appliance or said operational event.
- 6 A method according to claim 5, wherein the output means is responsive only if the emitted sound lies beyond a pre-established threshold level.
- 7 A method according to any one of the preceeding claims, wherein the appliance comprises a protective enclosure which protects the appliance from the surrounding environment and within which enclosure said two or more operational events occur, said method comprising providing said sound receiving transducer within said enclosure.
- 8 A method according to any one of the preceeding claims and comprising employing the output means to transmit signals related to the acoustic signatures of events within the operating sequence of the appliance to remote data processing means.
- 9 A method according to claim 8, wherein said transmission of signals from the output means occurs daily on a regular basis.
- 10 A method according to any one of the preceeding claims, wherein the sound receiving transducer is employed to receive sound signals from one operational event which comprises fluid flow and from a second

operational event which comprises operation of a mechanical or electro-mechanical device.

- 11 A method according to claim 10, wherein said fluid flow event is related to the process of combustion.
- 12 A method according to any one of the preceeding claims, wherein the monitoring means employs the signature of an operational event to establish the type of event which has occurred and then verifies that that operational event has occurred at a correct position in a normal operating sequence of the appliance.
- 13 A method according to any one of the preceeding claims, wherein the output means either substantially directly, or substantially indirectly via remote data processing means, causes operation of an alarm when the sound emitted by the appliance departs from a sound profile concomitant with proper functioning of the appliance.
- 14 A method according to claim 13, wherein the alarm is an audible alarm in the vicinity of the appliance.
- 15 A method according to claim 13, wherein an alarm is actuated at a position remote from the appliance.
- 16 A method according to any one of the preceeding claims, wherein the monitoring means is operable to cause shutting down of the appliance in the event of the acoustic signature of an operational event departing by a pre-determined amount from an acoustic signature concomitant with proper functioning of that operational event.

- 17 A method according to any one of the preceeding claims, and comprising providing within said enclosure a plurality of sound receiving transducers.
- 18 A method according to claim 17, wherein one transducer is selected to have a frequency response different from that of the or each other transducer.
- 19 A method according to any one of the preceeding claims, and providing to the monitoring means signals from transducers of a non-acoustic type.
- 20 A method according to claim 1 and substantially as herein before described.
- 21 A diagnostic tool for an energy conversion appliance of a kind which, in normal use, performs two or more operational events in a pre-determined sequence and each said event having a different acoustic signature, said diagnostic tool being adapted for performing a method in accordance with claim 1.
- 22 A diagnostic tool for an energy conversion appliance of a kind which, in normal use, performs two or more operational events in a pre-determined sequence and each said event having a different acoustic signature, said diagnostic tool comprising a sound receiving transducer coupled to output and monitoring means to identify, discriminate and log the acoustic signatures of said operational events within the operating sequence of the appliance, said monitoring means being operable to compare said received acoustic signatures with pre-established data.
- 23 A diagnostic tool according to claim 22, wherein means is provided to transmit to remote data processing means signals related to the acoustic

signatures of operating events within the operating sequence of the appliance.

- 24 A diagnostic tool according to claim 22 or claim 23, wherein the energy conversion appliance comprises a protective enclosure within which said operational events occur, the or each sound receiving transducer being provided within said enclosure.
- 25 A diagnostic tool according to any one of claims 22 to 24 and comprising at least two sound receiving transducers at least one of which has a frequency response different from that of the or each other sound receiving transducer.
- 26 A diagnostic tool according to any one of claims 22 to 25, wherein the output and monitoring means receives information related to the acoustic signature of one operational event which comprises fluid flow and a second operational event which comprises a mechanical or electro-mechanical operation.
- 27 A diagnostic tool according to any one of claims 22 to 26, wherein said sound receiving transducer is receptive to the acoustic signature associated with a combustion event.
- 28 A diagnostic tool according to any one of claims 22 to 27, wherein the output or monitoring means has coupled thereto a transducer of a kind responsive to signals other than sound.
- 29 A diagnostic tool according to claim 22 and substantially as hereinbefore described.